UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,298	09/17/2003	Michael C. Green	005513P018	5448

45288 7590 04/14/2009

VARIAN/BSTZ
BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER	
KALAM, ABUL	

ART UNIT	PAPER NUMBER
2814	

MAIL DATE	DELIVERY MODE
04/14/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/665,298	GREEN ET AL.	
	Examiner	Art Unit	
	Abul Kalam	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 January 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29,49 and 50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29, 49 and 50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-5, 7, 14, 16-18 and 20-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Harel et al. (WO 02/067014).

Regarding claim 1, Harel discloses a photodetector (Fig. 14) comprising:

a plurality of semiconductor materials (4 and 5, Fig. 14), forming a heterojunction (first material is different from the second material; pg. 30, 3rd para.), the plurality of semiconductor materials comprising:

a first semiconductor material (4, Fig. 14); and

a second semiconductor material (5, Fig. 14), coupled to the first semiconductor material (4), the first and second semiconductor materials being halides (pg. 30, 3rd para.), wherein at least one of the first and second semiconductor materials consists of a semiconductor material (HgI_2 PIB composite and the PBI_2 PIB composite are both semiconductor materials, pg. 3, lines 15-18).

Regarding claims 2-4, Harel discloses wherein the first semiconductor material (4, Fig. 14) comprises lead iodide (pg. 30, 3rd para.) and the second semiconductor

material (5, Fig. 14) comprises mercuric iodide (pg. 30, 3rd para.), and thus, since Harel teaches the same materials as claimed by Applicant, it is implicit that Harel's semiconductor materials also have approximately the same bandgap.

Regarding claim 5, Harel discloses the photodetector further comprising: a first contact (bottom pixel electrode, pg. 30, 2nd para.); and a second contact (6, Fig. 14), wherein the plurality of semiconductor materials are disposed between the first and second contacts.

Regarding claim 7, Harel discloses wherein the second semiconductor material comprises mercuric iodide (5, Fig. 14; pg. 30, 3rd para.) and the first semiconductor material (4, lead iodide; pg. 30, 3rd para.) is less chemically reactive than mercuric iodide with the contacts.

Regarding claim 14, Harel discloses wherein the plurality of semiconductor materials further comprises a third semiconductor material comprising lead iodide coupled to the second semiconductor material (pg. 31, 2nd para.).

Regarding claims 16-18, Harel discloses wherein the first semiconductor material comprises lead iodide and the second semiconductor material comprises mercuric iodide (pg. 30, 3rd para.), and each of the first and second semiconductor materials consists of a semiconductor material (HgI_2 PIB composite and the PBI_2 PIB composite are both semiconductor materials, pg. 3, lines 15-18). Furthermore, regarding the limitations of having different "conductivity types," and band gaps within "10 percent of each other," note that Harel discloses similar materials, and thus, the claimed properties are implicit.

Regarding claim 20, Harel discloses wherein the plurality of semiconductor materials further comprises a third semiconductor material comprising lead iodide coupled to the second semiconductor material (pg. 31, 2nd para.).

Regarding claims 21-23, Harel discloses wherein the first semiconductor material comprises bismuth iodide and the second semiconductor material comprises one of mercuric iodide and lead iodide (pg. 9, 5th para.).

Regarding claims 24-26, Harel discloses wherein the first semiconductor material comprises thallium bromide and the second semiconductor material comprising one of mercuric iodide and lead iodide (pg. 9, 5th para.).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 11-13, 15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harel ('014; cited above).

Regarding claims 11, 12 and 15, Harel teaches all the limitations of the claims, as set forth above in claims 4 and 14, respectively, with the exception of explicitly disclosing wherein the second semiconductor material is thicker than the first semiconductor; wherein the thickness of the first semiconductor material is less than approximately 250 microns; and wherein the thickness of third semiconductor material has a third thickness less than approximately 50 microns.

However, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 234 (CCPA 1955). Furthermore, where patentability is said to based upon particular chosen range or dimension recited in a claim, the Applicant must show that the chosen range or dimension is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the first, second and third semiconductor materials with a thickness in the claimed ranges, for the purpose of obtaining the desired properties of the photodetector. Furthermore, note that the claimed thicknesses do not yield unpredictable results.

Regarding claim 13, Harel discloses a photodetector (Fig. 14) comprising:

a plurality of semiconductor materials (4 and 5, Fig. 14), forming a heterojunction (first material is different from the second material; pg. 30, 3rd para.), the plurality of semiconductor materials comprising:

a first semiconductor material (4, Fig. 14); and

a second semiconductor material (5, Fig. 14), coupled to the first semiconductor material (4), the first and second semiconductor materials being a halides (pg. 30, 3rd para.), wherein at least one of the first and second semiconductor materials consists of a semiconductor material (HgI_2 PIB composite and the PBI_2 PIB composite are both semiconductor materials, pg. 3, lines 15-18).

wherein the first semiconductor material (4, Fig. 14) comprises lead iodide (pg. 30, 3rd para.) and the second semiconductor material (5, Fig. 14) comprises mercuric iodide (pg. 30, 3rd para.),

wherein the plurality of semiconductor materials further comprises a third semiconductor material comprising lead iodide coupled to the second semiconductor material (pg. 31, 2nd para.).

Thus, Harel teaches all the limitations of claim 13, with the exception of explicitly disclosing wherein the first and third semiconductor material each have a thickness less than approximately 50 microns and the second semiconductor material has a thickness greater than approximately 250 microns.

However, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by

routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 234 (CCPA 1955). Furthermore, where patentability is said to based upon particular chosen range or dimension recited in a claim, the Applicant must show that the chosen range or dimension is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the first, second, and third semiconductor materials with a thickness in the claimed ranges, for the purpose of obtaining the desired properties of the photodetector. Furthermore, note that the claimed thicknesses do not yield unpredictable results.

Regarding claim 19, Harel discloses a photodetector (Fig. 14) comprising:

a plurality of semiconductor materials (4 and 5, Fig. 14), forming a heterojunction (first material is different from the second material; pg. 30, 3rd para.), the plurality of semiconductor materials comprising:

a first semiconductor material (4, Fig. 14); and

a second semiconductor material (5, Fig. 14), coupled to the first semiconductor material (4), the first and second semiconductor materials being a halides (pg. 30, 3rd para.), wherein at least one of the first and second semiconductor materials consists of a semiconductor material (HgI_2 PIB composite and the PBI_2 PIB composite are both semiconductor materials, pg. 3, lines 15-18).

wherein the first semiconductor material (5, Fig. 14) comprises mercuric iodide (pg. 30, 3rd para.) and the second semiconductor material (4, Fig. 14) comprises lead iodide (pg. 30, 3rd para.),

Furthermore, regarding the limitations of having different "conductivity types," and band gaps within "10 percent of each other," note that Harel discloses similar materials, and thus, the claimed properties are implicit.

Thus, Harel discloses all the limitations of the claim with the exception of explicitly disclosing wherein the second semiconductor material is thicker than the first semiconductor material.

However, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 234 (CCPA 1955). Furthermore, where patentability is said to based upon particular chosen range or dimension recited in a claim, the Applicant must show that the chosen range or dimension is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the second semiconductor material thicker than the first semiconductor material, for the purpose of obtaining the desired properties of the photodetector. Furthermore, note that the claimed thicknesses do not yield unpredictable results.

3. Claims 1-5, 7-10, 16-18, 24-29 and 49-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 6,437,339).

Regarding claim 1, Lee discloses a photodetector (Fig. 3) comprising:

a plurality of semiconductor materials (2300 and 2500, Fig. 3), forming a heterojunction (first material is different from the second material, col. 4, lns. 45-47), the plurality of semiconductor materials comprising:

a first semiconductor material (2300, col. 4, lns. 45-46); and

a second semiconductor material (2500, col. 4, lns. 46-47), coupled to the first semiconductor material (2300, Fig. 3), the second semiconductor material being a halide (col. 4, lns. 45-47), wherein at least one of the first and second semiconductor materials consists of a semiconductor material (col. 4, lns. 45-47).

Thus, Lee discloses all the limitations of the claim, as shown in the embodiment of Fig. 3, with the exception of explicitly disclosing wherein the first semiconductor is a halide. However, in the embodiment shown in Fig. 1, Lee teaches that the first semiconductor material (300) may comprise selenium or other suitable photoconducting materials, such as PbI_2 (col. 2, lns. 32-38). Furthermore, Lee states that layer 2300, in the embodiment of Fig. 3, carries out a function similar to that of layer 300, in the embodiment of Fig. 1. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to use a halide for the first semiconductor metal because such a modification would have been considered a mere substitution of art recognized equivalents (col. 2, lns. 32-38) (MPEP 2144.06).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency . *In re Fount* 213 USPQ 532 (CCPA 1982).

Regarding claims 2-4, Lee discloses the photodetector wherein the first and second semiconductor materials have approximately the same band gap (col. 2, lns. 32-38; similar materials will have the similar properties), wherein the first material (300/2300) comprises an lead iodide compound (col. 2, line 35) and the second semiconductor material (2500) comprises mercuric iodide (col. 4 line 46).

Regarding claim 5, Lee discloses the photodetector further comprising: a first contact (bias electrode, Fig. 3); and a second contact (collector electrode, Fig. 3), wherein the first plurality of semiconductor materials are disposed between the first and second contacts (Fig. 3).

Regarding claim 7, Lee discloses the photodetector wherein the second semiconductor material (2500) comprises mercuric iodide (col. 4 line 46) and the first semiconductor material (300/2300) is less chemically reactive than mercuric iodide with the contacts (col. 2, lns. 32-38; similar materials will have the similar properties).

Regarding claims 8-10, note that layer 2500 can be considered the first semiconductor material and layer 300/2300 can be considered the second semiconductor material, and thus, Lee discloses in Fig. 3 wherein the second semiconductor material is thicker than the first semiconductor material. Regarding claims 9 and 10, Lee does not disclose wherein the first semiconductor material has a thickness less than approximately 250 microns or less than approximately 50 microns. However, Lee discloses that layer 2500 can be made much thinner than layer 2300 (col.

5, lns. 7-9). Accordingly, it would have been obvious to one of ordinary skill in art to use the thickness teaching of Lee in the range as claimed, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 234 (CCPA 1955). Furthermore, where patentability is said to based upon particular chosen range or dimension recited in a claim, the Applicant must show that the chosen range or dimension is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Furthermore, note that the claimed thicknesses do not yield unpredictable results.

Regarding claims 16-17, Lee discloses the photoconductor wherein the second semiconductor material (2500) has a conductivity type different than the first semiconductor material (300/2300, col. 2, ln. 37), wherein the band gap of the first and second semiconductor materials are within 10 percent of each other (col. 2, lns. 32-38; similar materials will have similar properties).

Regarding claim 18, Lee discloses the photodetector, wherein the first semiconductor material (300/2300) comprises lead iodide (col. 2, ln. 35) and the second semiconductor material (2500) comprises mercuric iodide (col. 4, ln. 46) and each of the first and second semiconductor materials consists of a semiconductor material.

Regarding claims 24-26, Lee discloses wherein the first semiconductor material (300/2300) comprises thallium bromide (col. 2, ln. 36) and the second semiconductor material comprises mercuric iodide (col. 4, ln. 46). Regarding the second semiconductor material being lead iodide, note that substituting lead iodide for mercuric

iodide would have been obvious to one skilled in the art, since such materials are considered art recognized equivalents (col. 2, lns. 32-38).

Regarding claims 27-29, Lee discloses the photodetector is coupled to a negative bias (Fig. 3), wherein the first contact is coupled to ground (collector electrode, Fig. 3), and the second contact is coupled to a negative voltage (bias electrode, Fig. 3).

Regarding claims 49, Lee discloses a photodetector (Fig. 3), comprising:

a plurality of semiconductor materials (2300 and 2500, Fig. 3), forming a heterojunction (first material is different from the second material, col. 4, lns. 45-47), the plurality of semiconductor materials comprising:

a first semiconductor material (2300, col. 4, lns. 45-46); and

a second semiconductor material (2500, col. 4, lns. 46-47), coupled to the first semiconductor material (2300, Fig. 3), the second semiconductor material consisting essentially of a halide (col. 4, lns. 45-47), wherein at least one of the first and second semiconductor materials consists essentially of a semiconductor material (col. 4, lns. 45-47).

Thus, Lee discloses all the limitations of the claim, as shown in the embodiment of Fig. 3, with the exception of explicitly disclosing wherein the first semiconductor consists essentially of a halide. However, in the embodiment shown in Fig. 1, Lee teaches that the first semiconductor material (300) may comprise selenium or other suitable photoconducting materials, such as PbI_2 (col. 2, lns. 32-38). Furthermore, Lee states that layer 2300, in the embodiment of Fig. 3, carries out a function similar to that of layer 300, in the embodiment of Fig. 1. Therefore, it would have been obvious to one

of ordinary skill in the art at the time of the invention, to use a halide for the first semiconductor metal because such a modification would have been considered a mere substitution of art recognized equivalents (col. 2, lns. 32-38) (MPEP 2144.06).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency . *In re Fount* 213 USPQ 532 (CCPA 1982).

Regarding claim 50, Lee discloses the photoconductor wherein the first semiconductor material (300/2300) is lead iodide (col. 2, ln. 35), and the second semiconductor material is mercuric iodide (2500, col. 4 line 46).

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. ('339) in view of Polischuk et al. (US 6,353,229).

Regarding claim 6, Lee discloses the photodetector wherein at least one of the first and second contacts comprise transparent electrode, col. 2 line 29.

But Lee does not disclose the photodetector wherein at least one of the first and second contacts comprise palladium. However, Polischuk discloses wherein the photodetector electrode consists of palladium, ITO (transparent), or Au (col. 5 lines 54-57). At the time of the invention was made, it would have been obvious to one of ordinary skill in the art to use palladium as one of the first or second contacts, because palladium is electrically stable and resistant to chemical erosion as well as intense heat.

Response to Arguments

Applicant's arguments filed January 2, 2009, have been fully considered but they are not persuasive.

Regarding the Harel reference and claim 1, Applicant argues the Patent Office has not identified and Applicants are unable to find any description in Harel that teaches or suggest a heterojunction of two halides, and at least one material that consists of a semiconductor material. The argument is not persuasive. Note that the there is no limitation in the claim which recites "a heterojunction of two halides." Applicant seems to be arguing about the limitation which states that "the first and semiconductor materials being Halides." In paragraph 3 of page 30, Harel discloses a HgI_2 PIB composite 5 and PbI_2 PIB composite 4. Furthermore, the PIB composites 4 and 5 are considered to be halides, because of the weight ratio of halide material to binder material, disclosed by Harel in lines 3-5 of page 20. Regarding, the at least one material that "consists of a semiconductor material," note that Harel describes the PIB composite as a "semiconductor" PIB composite (pg. 3, lines 15-16; pg. 30, line 6), and thus, Harel teaches a PIB composite which is a semiconductor material.

Regarding claim 2, Applicant argues that since Harel teaches particle in binder material, it is not implicit that Harel's semiconductor materials would also have approximately the same band gap. The argument is not persuasive. Harel discloses the same materials as the Applicant, HgI_2 and PbI_2, and Applicant has not provided any evidence to show that the particle in binder material would have a significant impact on the band gaps of the halide materials. Furthermore, as pointed out above, Harel

discloses a high weight ratio of halide material to binder material (polystyrene, pg. 20, lines 3-5), which suggests a much larger percentage of halide material relative to the binder material, in the PIB composition.

Regarding claims 11-12 and 15, Applicant argues that the reason that the ranges required by those claims provide benefits that are not taught or enable by any of the references. The argument is not persuasive. Similar to Applicant's disclosure on page 10, paragraph 30 of Applicant's specification, Harel teaches that typically, the primary layer is HgI_2, and the base layer or "buffer" layer, is PbI_2. It has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 234 (CCPA 1955). Thus, the benefits cited by the Applicant are not unexpected or unpredictable, and would have been obvious to one of ordinary skill in the art, based on Harel's teaching. Furthermore, the specific thicknesses claimed by the Applicant have not been shown to be critical or yield unpredictable results.

Regarding claim 19, see the responses to arguments above.

Regarding the Lee reference and claim 1, Applicant argues that the Patent Office has not identified any teaching or enablement in Lee of a heterojunction of a first halide material coupled to a second halide material. As set forth in the rejection of claim 1 above, Lee discloses all the limitations of the claim, as shown in the embodiment of Fig. 3, with the exception of explicitly disclosing wherein the first semiconductor is a halide. However, in the embodiment shown in Fig. 1, Lee teaches that the first semiconductor material (300) may comprise selenium or other suitable photoconducting materials,

such as PbI_2 (col. 2, lns. 32-38). Furthermore, Lee states that layer 2300, in the embodiment of Fig. 3, carries out a function similar to that of layer 300, in the embodiment of Fig. 1. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to use a halide for the first semiconductor metal because such a modification would have been considered a mere substitution of art recognized equivalents (Lee: col. 2, lns. 32-38) (MPEP 2144.06).

For claims 8-10, see the response to arguments for claims 11-12 and 15.

Regarding claims 24-26, Applicant argues that lead iodide and mercuric iodide are not equivalent materials. The argument is not persuasive. Lee discloses that lead iodide and mercuric iodide are indeed art recognized equivalents (col. 2, lns. 34-36).

Regarding claim 49, see the response to argument for claim 1.

Regarding claim 28, Applicant argues that Lee does not disclose wherein the first contact is coupled to ground and the second contact is coupled to a negative voltage. The argument is not persuasive. The first contact (collector electrode) is coupled to ground since the positive end of the voltage source is connected to ground (Fig. 3).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is (571)272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K./
Examiner, Art Unit 2814

/Phat X. Cao/
Primary Examiner, Art Unit 2814